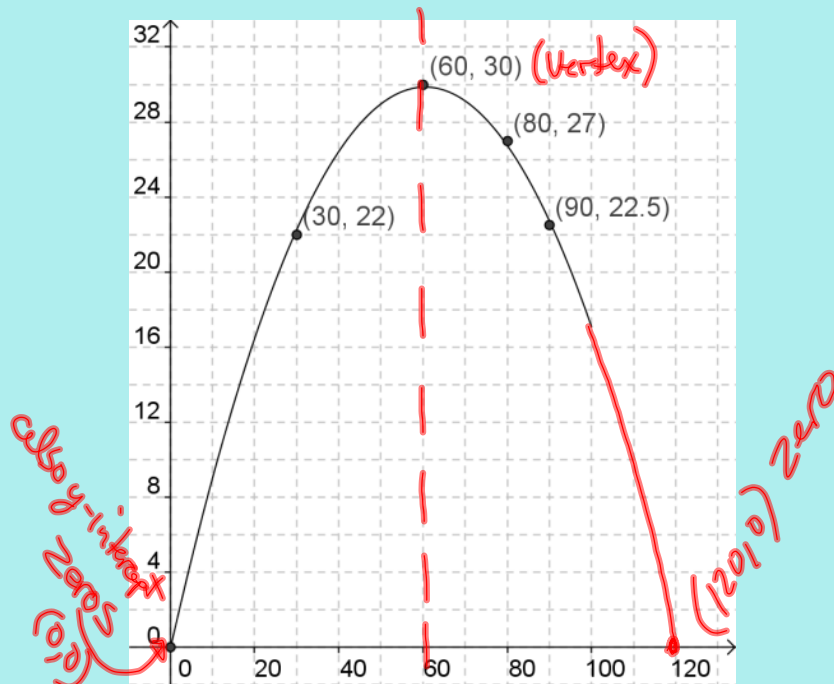
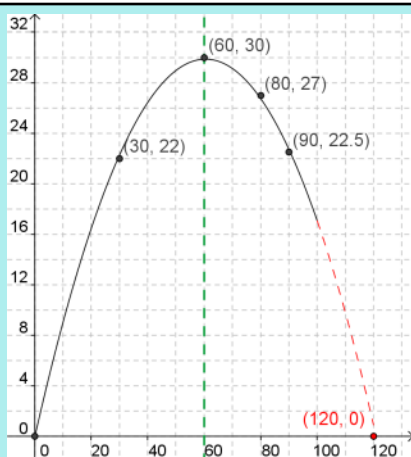


Data from the flight of a golf ball are graphed below. Identify key features that could be used to model the path using factored form or standard form.

$$y = a(x - s)(x - t) \quad y = ax^2 + bx + c$$



Apr 18-2:59 PM



- one zero at (0, 0)
- y-intercept at (0, 0)
- max at (60, 30)
- axis of symmetry $x = 60$
- other zero must be at (120, 0) by symmetry

standard

$$y = ax^2 + bx + c$$

factored

$$y = a(x - s)(x - t)$$

Apr 18-2:59 PM

L10(3.3) - Modelling Quadratics Using Factored and Standard Form

- 1) Sketch the parabola, if possible.
- 2) Identify the key properties given.
- 3) Use symmetry to deduce other key properties.
- 4) Select the equation based on key properties:
 factored form: at least one zero, two other points
 standard form: y-intercept, two other points
- 5) Substitute given information or points to solve for any missing values.
- 6) Does your answer make sense? Is there agreement with key features? Can you predict others?

Apr 18-3:11 PM

Ex.1 Find the equation, in factored form, of the quadratic that passes through the points $(-3, 0)$, $(5, 0)$ and $(7, 2)$.

$$y = a(x-r)(x-s)$$

$$= a(x - (-3))(x - (5))$$

$$= a(x+3)(x-5)$$

Sub (7, 2) to solve a

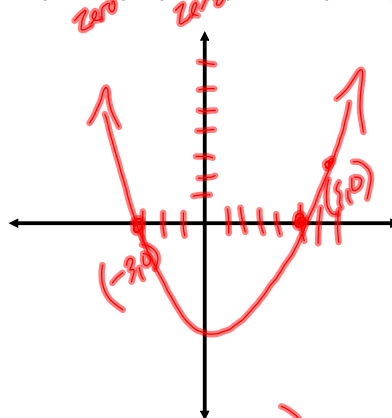
$$2 = a(7+3)(7-5)$$

$$2 = a(10)(+2)$$

$$\frac{2}{20} = \frac{20a}{20}$$

$$a = \frac{1}{10}$$

$$y = \frac{1}{10}(x+3)(x-5)$$



Apr 22-9:25 PM

Ex.2 Find the equation of the parabola, in factored form, that has only one zero, which is 2, and that passes through the point (5, -2).

$$y = a(x-2)(x-2)$$

$$y = a(x-2)^2$$

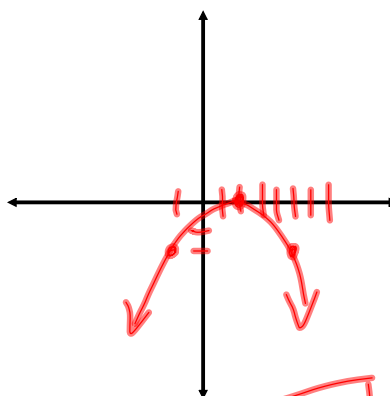
sub (5, -2) to solve a

$$y = a(x-2)^2$$

$$-2 = a(5-2)^2$$

$$\frac{-2}{9} = \frac{a(9)}{9}$$

$$a = -\frac{2}{9}$$



$$y = -\frac{2}{9}(x-2)^2$$

Apr 18-3:18 PM

Ex.3 A bird swoops from a branch 10 m above the ground. After 3 seconds it is 1 m above the grass, and then it flies to a perch in another tree. Assuming the path is approximately parabolic, model the flight of the bird.

$(3, 1)$ $(6, 10)$
 $y = ax^2 + bx + 10$ $y = ax^2 + bx + 10$
 $1 = a(3)^2 + 3b + 10$ $10 = a(6)^2 + b(6) + 10$
 $-9 = 9a + 3b$ $0 = 36a + 6b \div 2$
 $0 = 18a + 3b$

$\begin{array}{r} 0 \quad -9 = 9a + 3b \\ - \quad 0 = 18a + 3b \\ \hline -9 = -9a \\ \frac{-9}{-9} = \frac{-9a}{-9} \\ \boxed{a = 1} \end{array}$

Sub a = 1 into ②
 $0 = 18(1) + 3b$
 $-18 = 3b$
 $\frac{-18}{3} = \frac{3b}{3}$
 $b = -6$

∴ the equation in standard form is $y = x^2 - 6x + 10$

Nov 1-11:02 PM

Assigned Work:

p.175 # 1, 2, 4, 6, 9, 11, 15*